RC-02-45449/GL/ST

E.M.C Test Report

According to the standards:

EN 50121-3-2 Edition 2000

Equipment under test:
TIA: TRANSPONDER INTERROGATOR
ANTENNA (ANBAL) TYPE 843630

Company:
SIEMENS TRANSPORTATION SYSTEMS

DISTRIBUTION: Mr. ESTIEVENART **(Company:** SIEMENS TRANSPORTATION SYSTEMS**)**

Number of pages: 17 + 3 annexes

Ed.	Date	Modified pages	Prepared By Name Signature	Reviewed By Name signature	Approved By Name signature
0	**17/06/02**	**Creation**	**G. LAUNAY**		

NAME OF THE EQUIPMENT UNDER TEST: TIA: TRANSPONDER INTERROGATOR ANTENNA (ANBAL) TYPE 843630

NAME OF THE MANUFACTURER: SIEMENS TRANSPORTATION SYSTEMS

ADDRESS OF THE COMPANY INTRODUCING THE EQUIPMENT:

Company: SIEMENS TRANSPORTATION SYSTEMS

Address: 48 à 56, rue Barbès
BP 531
92542 Montrouge Cedex
France

Person in charge: Mr. ESTIEVENART

Present person during the tests: Mr. N'GUYEN

DATE OF TESTS: The 5th February 2002 and 12th March 2002

TESTS LOCATION: EMITECH laboratory in Montigny le Bretonneux (78)

TESTS OPERATORS: G. LAUNAY and P. COMAILLE

TESTS SUPERVISOR: E. COEURET

TABLE OF CONTENTS

1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment "**TIA: TRANSPONDER INTERROGATOR ANTENNA (ANBAL) TYPE 843630**" here in referred to as the EUT, according to the document listed below.

2. REFERENCE DOCUMENT

EN 50121-3-2 Edition 2000
Railway applications
Electromagnetic Compatibility
Part 3-2: Rolling stock - Apparatus

HARDWARE QUALIFICATION TEST PLAN
Réf.: DEL / NYL / 39.1473.01 / GLE / GLE
Ed / Rév.: 0002/00
(cf. customer's document 2)

HARDWARE ENVIRONMENTAL QUALIFICATION TEST PROCEDURE
Réf.: DPM / NYL / 14.1549.01 / JME / JME
Ed / Rév.: 0003/00
(cf. customer's document 1)

3. EQUIPMENT UNDER TEST (EUT) CONFIGURATION

See photograph next page.

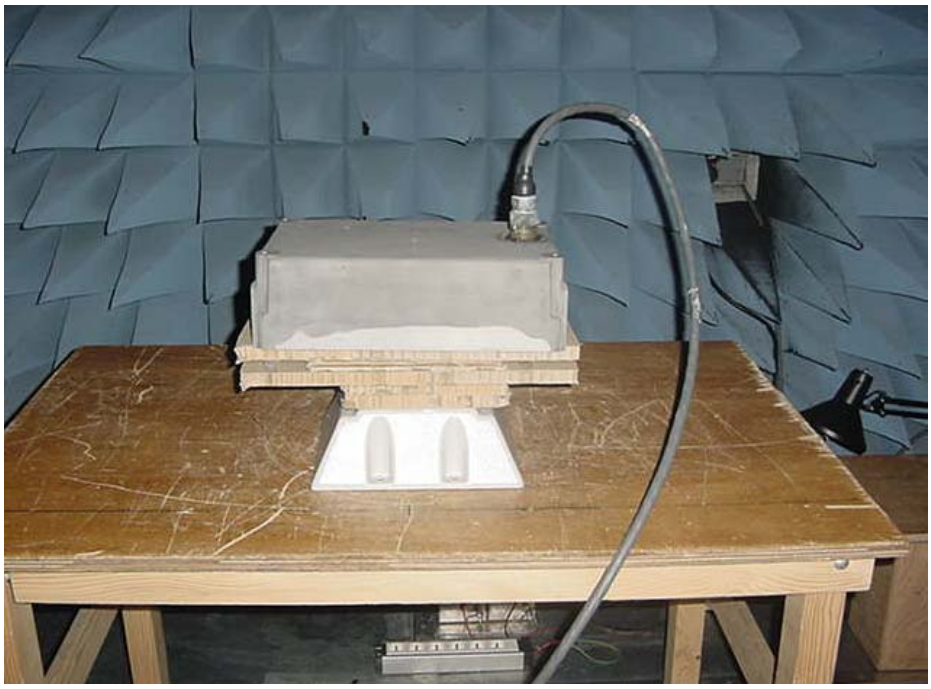
See customer's questionnaire in annex.

See customer's document in annex.

Modification of the equipment during the test: No

Serial number: PNLY 003 (V2)

Photograph of the equipment under test (EUT)



4. SUMMARY OF TEST RESULTS

The following table summarizes test results of the EUT.

Designation of test	Test results		Comments
	Pass	Fail	
Harmonics measurement			N.A.
Flicker measurement			N.A.
Radiated emission in absorber-lined shielded chamber (procedure E1)	x		
Conducted emission on AC mains ports			N.A.
Radiated electric field immunity (procedure E3)	x		
Conducted RF immunity on AC mains ports			N.A.
Conducted RF immunity on input-output cable (procedure E6)	x		
Electrical fast transient/burst immunity on AC mains ports			N.A.
Electrical fast transient/burst immunity on input-output cable (procedure E8)	x		
Electrostatic discharges immunity			N.A.
Surge immunity on AC mains ports			N.A.
Voltage dips, short interruptions and voltage variation immunity			N.A.

N.A.: Not Applicable

In emission:

The tested sample "**TIA: TRANSPONDER INTERROGATOR ANTENNA (ANBAL) TYPE 843630**" complies with the requirements of the standard:

- EN 50121-3-2 Edition 2000

according to the limits specified in the present report.

In immunity:

The tested sample "**TIA: TRANSPONDER INTERROGATOR ANTENNA (ANBAL) TYPE 843630**" complies with the requirements of the standard:

- EN 50121-3-2 Edition 2000

according to criteria specified in the present report.

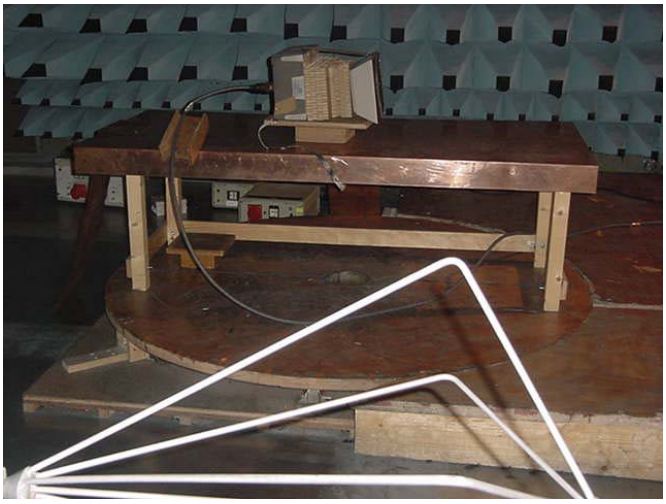
5. RADIATED EMISSION IN ABSORBER-LINED SHIELDED CHAMBER (procedure E1)

Standard: EN 50121-3-2 Edition 2000

Test method: EN 55011 Edition 1998

Equipment under test arrangement

Floor standing EUT is placed directly on the horizontal metal ground plane, the points of contact being consistent with normal use, but separated from metallic contact with the ground plane by up to 12 mm of insulation.



Frequency range: 30 MHz - 1 GHz

Detection mode: Peak

Resolution:

Frequency range	Resolution bandwidth	Video bandwidth
30 MHz to 1 GHz	100 kHz	300 kHz

Measurement distance: 3 m

Limit: The EUT must satisfy emission requirements of the standard for class A as shown in table below.

Frequency range (MHz)	Limit for Class A (dBµV/m)	Limit for FCC part 15 (dBµV/m)
30 to 88	50	50
88 to 216	50	53.5
216 to 230	50	56.4
230 to 960	57	56.4
960 to 1000	57	59.5

Limits of radiated disturbances of the CISPR 11 or EN 55011 are specified for a test distance of 10 meters for class A equipment. The measurement distance used for test in the present report being 3 meters, published results are obtained by a theoretical conversion of the limit (as described in the standard).

Operating mode during the test:

The EUT is connected and powered on by the test tool through the antenna cable. The test tool is configured in the transponder reading mode.

Instrumentation test list:

Compteur	NoEmitech	Category	Marque	Type
4	1/02/18/001	Spectrum analyzer	Hewlett Packard	8568 B
48	3/01/12/018	Preamplifier	Mini-Circuits	ZFL-1000LN
260	3/24/18/009	Biconical antenna	Electro-Metrics	BIA 25/30
294	3/24/18/045	Log-periodic antenna	Rohde et Schwarz	HL223
549	4/16/00/008	Shielded enclosure	SIDT	C.5
1694	4/34/00/052	Software	Emitech	UTEMC3H7

Results:

Curve reference	Comments
Curve 1	Peak detection measure in vertical polarization
Curve 2	Peak detection measure in horizontal polarization

Observation during the test:

Measures in absorber-lined shielded chamber present a level below the limit given above and with a sufficient margin to suppose this result would be validated with a measurement in open area test site.

Curve 1

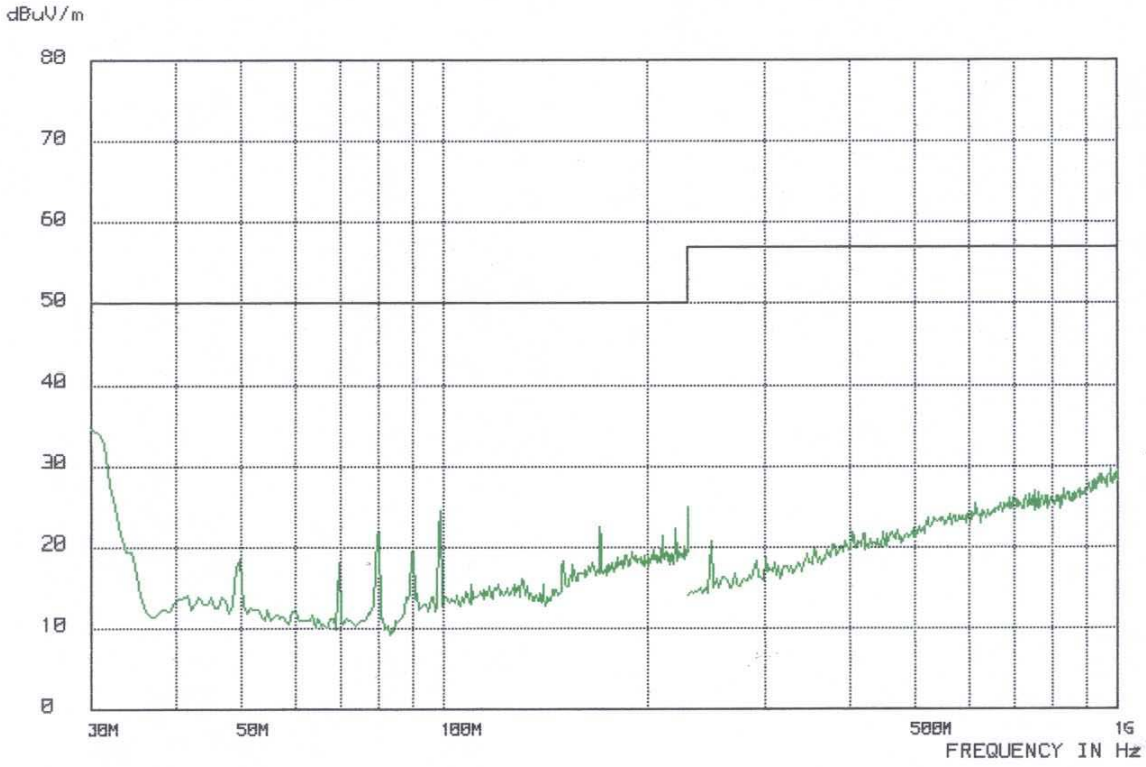
TIA

RADIATED ELECTRIC FIELD MEASUREMENT

PEAK DETECTION / MAX HOLD

VERTICAL POLARIZATION

04 FEBRUARY 2002



Fmin (MHz)	Fmax (MHz)	RBW (kHz)
30	230	100
230	1000	100

Curve 2

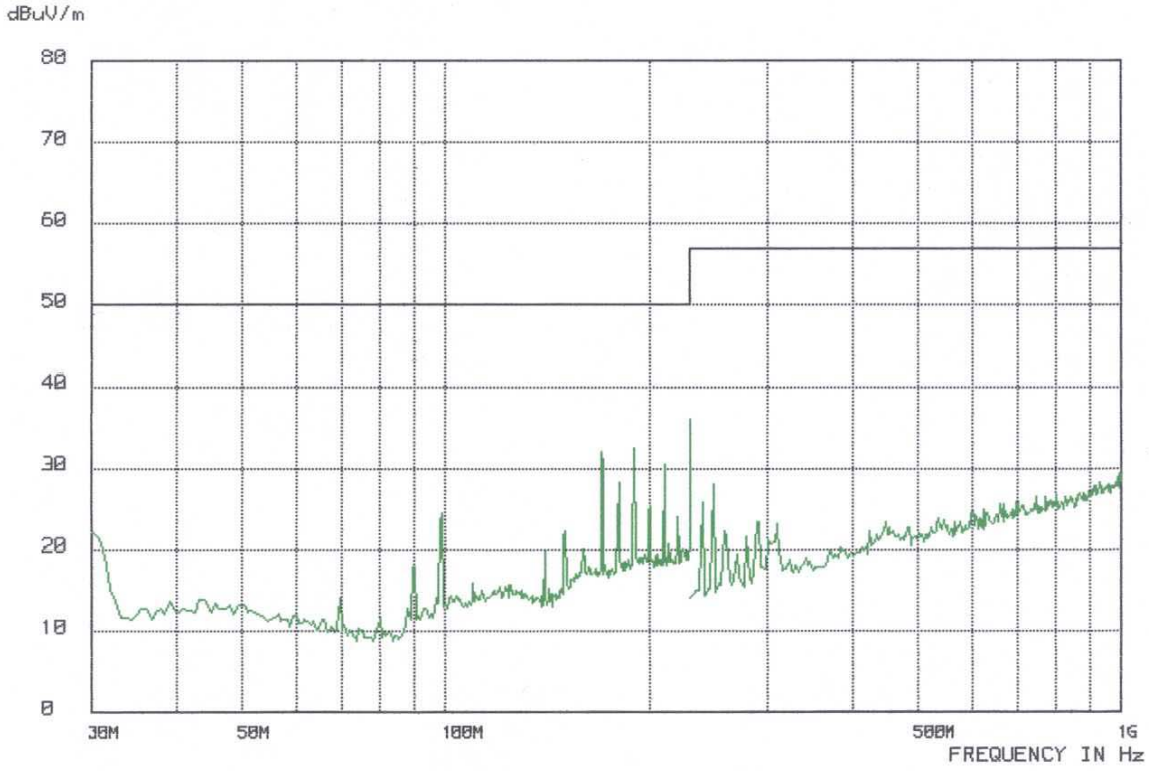
TIA

RADIATED ELECTRIC FIELD MEASUREMENT

PEAK DETECTION / MAX HOLD

HORIZONTAL POLARIZATION

04 FEBRUARY 2002



Fmin (MHz)	Fmax (MHz)	RBW (kHz)
30	230	100
230	1000	100

6. *RADIATED ELECTRIC FIELD IMMUNITY (procedure E3)*

Dates	Temperature (°C)	Humidity (%HR)	Pressure (hPa)
5/02/02	18.5	47	986
12/03/02	20	41	1011

Standard: EN 50121-3-2 Edition 2000

Test method: EN 61000-4-3 Edition 1996

Equipment under test arrangement

The equipment under test (EUT) is set out in such a way that the side submitted to the test be located in homogeneous zone of the previously calibrated field.
In compliance with the calibration, some anechoic panels are placed on the ground. Used antennas are placed according to the calibration specifications at a distance of 3 m from the tested side of the EUT.

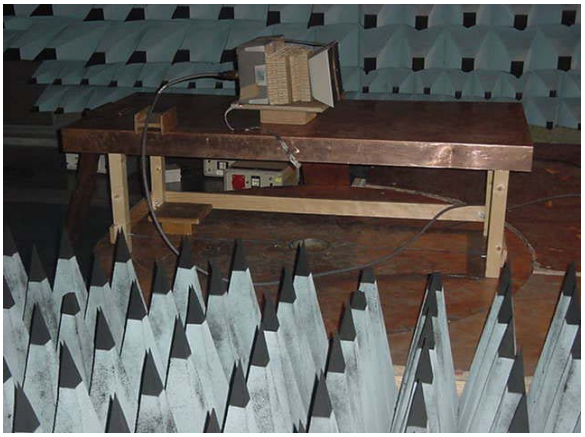


Photo 1 : 80-1000 MHz

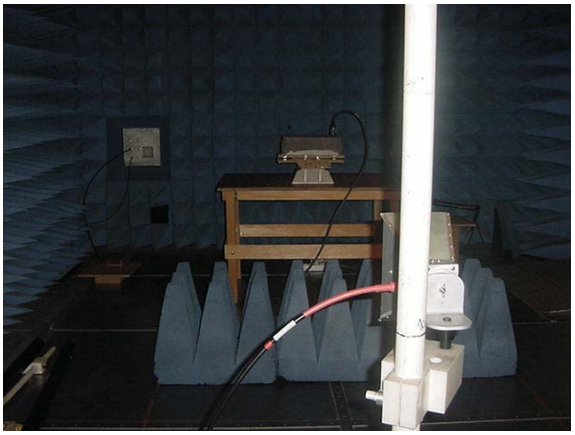


Photo 2 : 1-3 GHz

Frequency range (MHz)	Specification level	Modulation	Frequency step	Aptitude criteria
80 to 3000	20 V/m on 1 side Vertical polarization Horizontal polarization	80% AM 1kHz	1 % of the preceding frequency 2s dwell	A

Susceptibility criteria:

The test tool shall not return an error. If an error occurs, the frame error rate (FER) shall be less than 2/10 for a test duration of more than 10 seconds.

Equipment control procedure:

The EUT is connected and powered on by the test tool through the antenna cable. The test tool is configured in the transponder reading mode (see § 5.3 of the customer's document).

Instrumentation test list:

	Compteur	NoEmitech	Category	Marque	Type
Date:5/02/2002	4	1/02/18/001	Spectrum analyzer	Hewlett Packard	8568 B
	313	5/24/00/047	Log-periodic antenna	Rohde et Schwarz	HL 023A1
	507	3/24/18/075	Biconical antenna	Electro-Métrics	BIA-30HF
	549	4/16/00/008	Shielded enclosure	SIDT	C.5
	1140	2/04/24/044	Synthesizer	Marconi-Adret	741A
	1716	3/17/12/051	Coupler	CMC	440930
	1920	4/34/00/063	Software	Emitech	IMCEM v1-8
	2139	3/01/12/095	Amplifier	Amplifier Research	500W1000A

	Compteur	NoEmitech	Category	Marque	Type
Date:12/03/2002	565	3/01/12/034	Amplifier	Nuclétudes	M.20.40.100
	633	3/17/12/014	Coupler	CMC	440148-2-4 GHz 40dB
	778	4/16/00/011	Shielded enclosure	Ray proof	C.9
	941	3/24/18/149	Horn antenna	Emco	3115
	1538	2/04/24/052	Synthesizer	Anritsu/Wiltron	68347B
	1718	3/17/12/053	Coupler	CMC	440191
	1722	3/01/12/079	Amplifier	TMD	PTC 6342
	1920	4/34/00/063	Software	Emitech	IMCEM v1-8
	1957	4/04/00/058	Function generator	TTi	TG230

Results:

Frequency range (MHz)	Tested side	Polarization	Applied Level (V/m)	Comments
80 to 3000	See photos	Vertical	20	**N.R.**
		Horizontal	20	**N.R.**

N.R.: Nothing to report

Observation during the test:

No dysfunction was noticed during the test.

EUT met performance criterion A for radiated immunity.

7. CONDUCTED RF IMMUNITY ON INPUT-OUTPUT CABLE (procedure E6)

Temperature (°C)	Humidity (%HR)	Pressure (hPa)
18.5	47	986

Kind of input-output: Antenna cable.

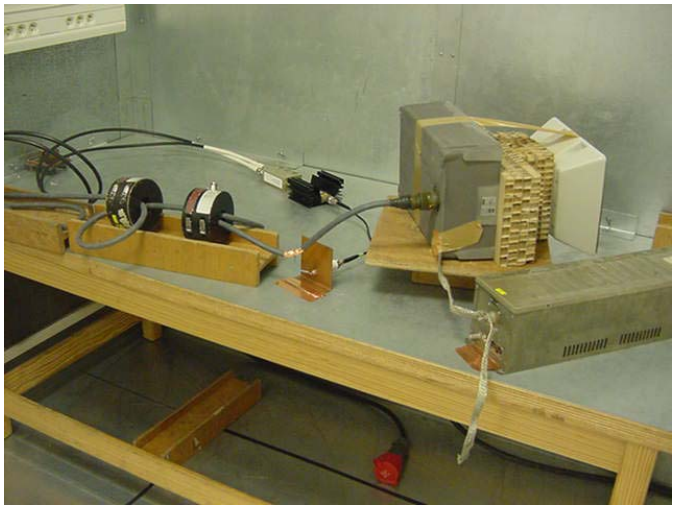
Standard: EN 50121-3-2 Edition 2000

Test method: EN 61000-4-6 Edition 1996

Equipment under test arrangement

The equipment under test (EUT) is placed on but insulated from the ground plane by a 0.1 m insulator. Excess I/O cabling are placed upon an insulating support which maintained 30 mm to 50 mm height above the ground reference plane.

The equipment under test (EUT) is connected to the ground through a M1 CDN.



Frequency range (MHz)	Specified level	Modulation	Frequency step	CDN	Aptitude criteria
0.15 to 80	3 Vrms	80% AM 1kHz	1 % of the preceding frequency 2s dwell	Direct injection	A

Susceptibility criteria:

The test tool shall not return an error. If an error occurs, the frame error rate (FER) shall be less than 2/10 for a test duration of more than 10 seconds.

Equipment control procedure:

The EUT is connected and powered on by the test tool through the antenna cable. The test tool is configured in the transponder reading mode (see § 5.3 of the customer's document).

Instrumentation test list:

Compteur	NoEmitech	Category	Marque	Type
10	3/01/12/007	Amplifier	Eaton	BF 5001
795	2/04/24/032	Synthesizer	Giga-tronics	6060B
860	3/17/12/021	Coupler	Kalmus	DC100R
1066	2/11/12/018	Milliwattmeter	Boonton	4200 RF
1067	2/11/12/019	Power probe	Boonton	4200-6E
1786	3/24/18/294	Resistor	Emitech	Injection galvanique 801-6
1803	3/24/18/297	Coupling/Decoupling network	Emitech	801-6/M1
1804	4/16/00/020	Test enclosure	Emitech	JD
1920	4/34/00/063	Software	Emitech	IMCEM v1-8
2147	2/18/12/183	Attenuator	Câbles & connectiques	6dB - 100W

Results:

Cable	Frequency range (MHz)	Applied Level	Comments
Antenna cable	0.15 to 80	3 Vrms	**N.R.**

N.R.: Nothing to report

Observation during the test:

No dysfunction was noticed during the test.

The EUT met performance criterion A for conducted RF immunity.

8. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY ON INPUT-OUTPUT CABLE (procedure E8)

Temperature (°C)	Humidity (%HR)	Pressure (hPa)
18.5	**47**	**986**

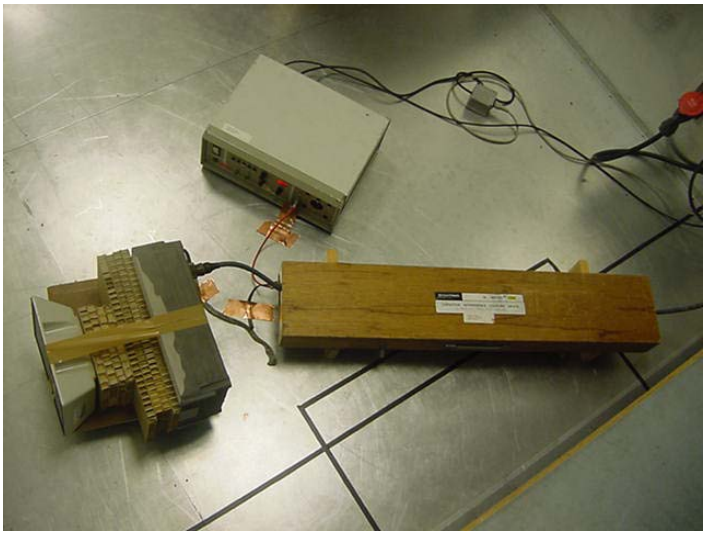
Standard: EN 50121-3-2 Edition 2000

Test method: EN 61000-4-4 Edition 1995

Equipment under test arrangement

The equipment under test (EUT) is placed on but insulated from the ground reference plane by a 10 cm insulator.

Cable to be tested is inserted inside the coupling clamp, which is supplied by the transient generator placed on the ground reference plane.



Specified level	Transient characteristics	Duration	Aptitude criteria
± 2000 V	Tr/Th ns (5/50) Repetition frequency 5 kHz	1 min	A

Susceptibility criteria:

The test tool shall not return an error. If an error occurs, the frame error rate (FER) shall be less than 2/10 for a test duration of more than 10 seconds.

Equipment control procedure:

The EUT is connected and powered on by the test tool through the antenna cable. The test tool is configured in the transponder reading mode (see § 5.3 of the customer's document).

Instrumentation test list:

Compteur	NoEmitech	Category	Marque	Type
252	3/23/12/007	Capacitive clamp	Schaffner	SL 400-071
925	3/13/12/061	Transient generator	Schaffner	NSG 1025
1804	4/16/00/020	Test enclosure	Emitech	JD

Results:

Level (V)	Comments
+ 2000	**N.R.**
- 2000	**N.R.**

N.R.: Nothing to report

Observation during the test:

No dysfunction was noticed during the test.

The EUT met performance criterion A for fast transient, common mode immunity.

ANNEX 1

Customer's questionnaire

(2 pages)

Section 1 - Equipment under test:

Designation : TIA : Transponder Interrogator Antenna (ANBAL) .....
.....

Type (or commercial reference): 843630 .....

Serial number : PNYL 003 (V 2) .....
.....

Manufacturer: Siemens Transportation Systems .....
Address: 48 à 56, rue Barbès BP 531 .....
92542 Montrouge Cedex .....

Company introducing the equipment: Siemens Transportation Systems .....
Address: 48 à 56, rue Barbès BP 531.....
92542 Montrouge Cedex.....
.....
Name of the Person in charge of the Product: D. Grimbert.....

State of development: ❑ prototype ■ pre-serial ❑ serial

Power Supply : (If several types , indicate each of them) : no power supply

❑ single phase Voltage: .....Vac
❑ three phases Voltage: .....Vac❑ continuous Voltage: Vdc
❑ AC/DC adapter Voltage: .....Vac / ..... Vdc

Power
❑ greater than 1kW
❑ less than 1kW

■ Equipment for professional use only
❑ Equipment other than lighting appliances with power < 75W

Dimensions : (height x length x width in cm) : 12,2 x 40,4 x 25,4 .....

Section 2 – Schematic of the configuration & Interconnection cables:

Please draw the product configuration with all cables that might be connected to it, and indicate cables length :
See figure 5-1 of "CC Transponder Interrogator Antenna hardware environmental qualification test procedure" (DRM/NYL/14.1549.01/JME/JME)

Please list all interconnection cables [(1)] and their characteristics (recommanded max. length, type…) :

See § 4.5 of "CC Transponder Interrogator Antenna hardware environmental qualification test procedure" (DRM/NYL/14.1549.01/JME/JME).....

One cable, recommended max length : 10 m.....

.....*(1) Cables likely to be connected to the equipment (not only those provided by the manufacturer)*

Section 3 : Control procedure to be used during immunity tests

This section describes how it's possible to verify if the equipment is working correctly during the tests.

Procedure (description of the implementation of control means):

See § 5.4 of "CC Transponder Interrogator Antenna hardware environmental qualification test procedure" (DRM/NYL/14.1549.01/JME/JME)

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.....

List of equipment used to realize the control according to the procedure above (except adverse information, equipments allowing to verify the acceptance criteria are dependent on the customer)

OTPB n°1 : outil de test portable de balise (transponder test tool) with software WINXL V 216.19 .....

Balise PNYL 017 (transponder) with programme ATR4.tek (Checksum 9991).....

1 Personal computer .....

.....

Important: During immunity tests, it might be necessary to protect the control equipments from the disturbances applied during the test. Accordingly, interconnection cables length should be at least 5 m. In case of impossibility, contact us about this.

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9. Section 4 : Susceptibility criteria

In this section, please indicate which function(s) must not be damaged (or which is the maximum allowed level in terms of loss of performances) when the equipment is disturbed:

By a continuous disturbance (electrical field, radiated or conducted, for example)

See § 5.4 of "CC Transponder Interrogator Antenna hardware environmental qualification test procedure" (DRM/NYL/14.1549.01/JME/JME)

FER < 2/10 (FER : Frame Error Rate).....

.....

.....

By a transient disturbance (electrostatic discharge for example)

See § 5.4 of "CC Transponder Interrogator Antenna hardware environmental qualification test procedure" (DRM/NYL/14.1549.01/JME/JME)

FER < 2/10 (FER : Frame Error Rate).....

.....

.....

I assess that the informations included in this questionnaire are right.

Signature of the person introducing the equipment:
(Date and signature)

ANNEX 2

Customer's document 1

(24 pages)

ANNEX 3

Customer's document 2

(71 pages)